

What is claimed is:

1. In a satellite communication system including an uplink and a bandwidth manager storing bandwidth release parameters, said system being subject to user agreement terms and to system data loading, a method of allocating uplink bandwidth among user terminals of the system subject to terminal data loading, the method comprising:

assigning initial bandwidth allocations of the uplink bandwidth for one or more of the user terminals;

assigning fair shares of the uplink bandwidth allocated to one or more of the user terminals based on one or more of the system data loading, the terminal data loading and the user agreement terms; and

releasing uplink bandwidth previously allocated to one or more of the user terminals based on one or more of the terminal data loading and the bandwidth release parameters.

2. A method according to claim 1, wherein said assigning initial bandwidth allocations comprises:

determining initial bandwidth needs at one or more of said user terminals in response to data activity at said one or more user terminals;

transmitting initial bandwidth requests from one or more of the user terminals to the bandwidth manager; and

transmitting the initial bandwidth allocations to one or more of the user terminals.

3. A method according to claim 2, wherein the uplink comprises at least one allocated signaling channel and wherein the step of transmitting initial bandwidth requests comprises communicating over the allocated signaling channel.

4. A method according to claim 2, wherein the step of transmitting initial bandwidth requests comprises communicating over the initial bandwidth allocation in the uplink.

5. A method according to claim 1, wherein the satellite communication system is arranged to transmit data via a fixed bandwidth, and wherein the method further comprises identifying the need for a fixed bandwidth based on the data to be transmitted over the satellite communication system.

6. A method according to claim 2, wherein the step of transmitting initial bandwidth requests comprises transmitting initial minimal bandwidth allocation requests based on the data to be transmitted over the satellite communication system.

7. A method according to claim 2, wherein the step of transmitting initial bandwidth requests comprises transmitting a request from a first terminal of said user terminals for a fixed amount of bandwidth at the first terminal's allocated fair share of the uplink bandwidth based on the data to be transmitted over the satellite communication system.

8. A method according to claim 1, wherein the step of assigning fair shares of the uplink bandwidth comprises transmitting a request from a first terminal of said user terminals for bandwidth at the first terminal's fair share of the uplink bandwidth based on the data to be transmitted over the satellite communication system.

9. A method according to claim 1, wherein the step of releasing uplink bandwidth comprises transmitting a request from a first terminal of said user terminals to reduce allocated bandwidth of the first terminal from bandwidth at the first terminal's fair share to a minimal communication rate based on the data to be transmitted over the satellite communication system and bandwidth manager provided lag time.

10. A method according to claim 1, wherein the step of releasing uplink bandwidth comprises transmitting a request from a first terminal of said user terminals for reducing allocated bandwidth from a minimal communication rate to no allocated bandwidth based on the data to be transmitted over the satellite communication system and bandwidth manager provided lag time.

11. A method according to claim 2, wherein the step of transmitting initial bandwidth requests comprises combining the initial bandwidth request of a first terminal of said user terminals with initial data to be transferred by the first terminal.

12. A method according to claim 2, wherein the step of transmitting the initial bandwidth allocations to the one or more user terminals further comprises the step of transmitting the initial bandwidth allocations from the bandwidth manager.

13. A method according to claim 2, wherein the satellite communication system comprises a downlink and wherein the step of transmitting the initial bandwidth allocations to the one or more user terminals comprises communicating over a signaling channel allocated in the downlink to said one or more user terminals.

14. A method according to claim 5, further comprising allocating a fixed bandwidth to a first terminal of the user terminals in response to a request for a fixed bandwidth from the first terminal to the bandwidth manager.

15. A method according to claim 7, further comprising allocating to the first terminal a fixed amount of bandwidth at the first terminal's allocated fair share of the uplink bandwidth based on the data to be transmitted over the satellite communication system.

16. A method according to claim 8, further comprising allocating to the first terminal bandwidth at the first terminal's fair share of the uplink bandwidth based on the data to be transmitted over the satellite communication system.

17. A method according to claim 10, further comprising de-allocating all bandwidth to the first terminal.

18. A method according to claim 1, further comprising allocating minimum bandwidth to one or more of said user terminals and allocating one or more signaling channels in said uplink, wherein an individual terminal of said user terminals is subject to said agreement terms, wherein the individual terminal requests fair share bandwidth and wherein the step of assigning fair shares comprises the step of computing the fair share bandwidth for the individual terminal as:

$$\text{UserFairShare}_{\text{Individual}} = \text{UserSubscribedBandwidth}_{\text{Individual}} * \frac{\text{AvailableBandwidth}}{\text{Sum}(\text{UserSubscribedBandwidth}_{\text{Requesting}})}$$

AvailableBandwidth / Sum(UserSubscribedBandwidth_{Requesting})

where UserFairShare_{Individual} comprises the bandwidth allocated to the individual terminal, UserSubscribedBandwidth_{Individual} comprises the bandwidth allowed the individual terminal by the agreement terms, AvailableBandwidth

comprises the amount of uplink bandwidth available after said minimum bandwidth and signaling channels are allocated, and $\text{UserSubscribedBandwidth}_{\text{Requesting}}$ comprises the bandwidth allowed each of the user terminals requesting fair share bandwidth by the agreement terms.

19. A method according to claim 9, wherein the step of releasing uplink bandwidth comprises:

providing to said user terminals a full bandwidth shut down lag time; and
computing a point of time for initiating said releasing uplink bandwidth based on the system data loading and said lag time.

20. A method according to claim 10, wherein the step of reducing allocated bandwidth comprises:

providing to said user terminals a full bandwidth shut down lag time; and
computing a point of time for initiating said reducing allocated bandwidth based on the system data loading and said lag time.

21. In a satellite communication system including an uplink, said system being subject to user agreement terms and to system data loading, apparatus for allocating uplink bandwidth among, the method comprising:

user terminals subject to terminal data loading; and
a bandwidth manager storing bandwidth release parameters, said manager being arranged to
assign initial bandwidth allocations of the uplink bandwidth for one or more of the user terminals;

assign fair shares of the uplink bandwidth allocated to one or more of the user terminals based on one or more of the system data loading, the terminal data loading and the user agreement terms; and

release uplink bandwidth previously allocated to one or more of the user terminals based on one or more of the terminal data loading and the bandwidth release parameters.

22. Apparatus according to claim 21, wherein said manger is arranged to

determine initial bandwidth needs at one or more of said user terminals in response to data activity at said one or more user terminals;

transmit initial bandwidth requests from one or more of the user terminals to the bandwidth manager; and

transmit the initial bandwidth allocations to one or more of the user terminals.

23. Apparatus according to claim 22, wherein the uplink comprises at least one allocated signaling channel and wherein the manager is arranged to communicate over the allocated signaling channel.

24. Apparatus according to claim 22, wherein the manager is arranged to communicate over the initial bandwidth allocation in the uplink.

25. Apparatus according to claim 21, wherein the satellite communication system is arranged to transmit data via a fixed bandwidth, and wherein the terminals are arranged to identify the need for a fixed bandwidth based on the data to be transmitted over the satellite communication system.

26. Apparatus according to claim 22, wherein the terminals are arranged to transmit initial minimal bandwidth allocation requests based on the data to be transmitted over the satellite communication system.

27. Apparatus according to claim 22, wherein a first terminal of the user terminals is arranged to transmit requests for a fixed amount of bandwidth at the first terminal's allocated fair share of the uplink bandwidth based on the data to be transmitted over the satellite communication system.

28. Apparatus according to claim 21, wherein a first terminal of said user terminals transmit a request for bandwidth at the first terminal's fair share of the uplink bandwidth based on the data to be transmitted over the satellite communication system.

29. Apparatus according to claim 21, wherein said manger stores lag time and wherein a first terminal of said user terminals transmits a request to reduce allocated bandwidth of the first terminal from bandwidth at the first terminal's fair share to a minimal communication rate based on the data to be transmitted over the satellite communication system and the lag time.

30. Apparatus according to claim 21, wherein the manager stores a lag time and wherein a first terminal of said user terminals transmits a request for reducing allocated bandwidth from a minimal communication rate to no allocated bandwidth based on the data to be transmitted over the satellite communication system and the lag time.

31. Apparatus according to claim 22, wherein a first terminal of the user terminals is arranged to combine the initial bandwidth request with initial data to be transferred by the first terminal.

32. Apparatus according to claim 22, wherein the manager is arranged to transmit the initial bandwidth allocations to the user terminals.

33. Apparatus according to claim 22, wherein the satellite communication system comprises a downlink and wherein the manager is arranged to transmit the initial bandwidth allocations to the one or more user terminals by communicating over a signaling channel allocated in the downlinks.

34. Apparatus according to claim 25, wherein the manager is arranged to allocate a fixed bandwidth to a first terminal of the user terminals in response to a request for a fixed bandwidth from the first terminal to the manager.

35. Apparatus according to claim 27, wherein the manager is arranged to allocate to the first terminal a fixed amount of bandwidth at the first terminal's allocated fair share of the uplink bandwidth based on the data to be transmitted over the satellite communication system.

36. Apparatus according to claim 28, wherein the manager is arranged to allocate to the first terminal bandwidth at the first terminal's fair share of the uplink bandwidth based on the data to be transmitted over the satellite communication system.

37. Apparatus according to claim 30, wherein the manager is arranged to de-allocate all bandwidth to the first terminal.

38. Apparatus according to claim 21, wherein the manager is arranged to allocate minimum bandwidth to one or more of said user terminals and to allocate one or more signaling channels in said uplink, wherein an individual terminal of said user terminals is subject to said agreement terms, wherein the individual terminal requests fair share bandwidth and wherein the manager is arranged to assigning fair share according to the expression

$$\text{UserFairShare}_{\text{Individual}} = \frac{\text{UserSubscribedBandwidth}_{\text{Individual}} * \text{AvailableBandwidth}}{\text{Sum}(\text{UserSubscribedBandwidth}_{\text{Requesting}})}$$

where $\text{UserFairShare}_{\text{Individual}}$ comprises the bandwidth allocated to the individual terminal, $\text{UserSubscribedBandwidth}_{\text{Individual}}$ comprises the bandwidth allowed the individual terminal by the agreement terms, $\text{AvailableBandwidth}$ comprises the amount of uplink bandwidth available after said minimum bandwidth and signaling channels are allocated, and $\text{UserSubscribedBandwidth}_{\text{Requesting}}$ comprises the bandwidth allowed each of the user terminals requesting fair share bandwidth by the agreement terms.

39. Apparatus according to claim 29, wherein the manager is arranged to:
provide to said user terminals a full bandwidth shut down lag time; and
compute a point of time for initiating said request to reduce uplink bandwidth based on the system data loading and said lag time.

40. Apparatus according to claim 30, wherein the manager is arranged to:
provide to said user terminals a full bandwidth shut down lag time; and
compute a point of time for initiating said request for reducing allocated bandwidth based on the system data loading and said lag time.